

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1-19. (Canceled)

20. (Currently Amended) A composition comprising a mesenchymal stem cell (MSC) incorporated with a nucleic acid which encodes a hyperpolarization activated, cyclic nucleotide gated 2 (HCN2) ion channel in an amount sufficient to create an ion channel in the cell MSC, wherein the MSC is capable of forming a gap junction with a cell of a mammalian heart when site-specifically introduced directly into the mammalian heart.

21-48. (Canceled)

49. (Currently Amended) A method of expressing a functional hyperpolarization activated, cyclic nucleotide gated 2 (HCN2) ion channel in a syncytial structure mammalian heart comprising: (1) preparing the composition of claim 20; and (2) site-specifically introducing the composition directly into the syncytial structure heart, wherein the MSC forms a gap junction with a cell of the heart.

50. (Canceled) ~~The method of claim 49, wherein the syncytial structure is a mammalian heart.~~

51. (Currently Amended) A method of treating a cardiac rhythm disorder in a mammal, wherein the disorder is at least one of conduction block, complete atrioventricular block, incomplete atrioventricular block or sinus node dysfunction, which method comprises site-specifically introducing directly into the mammal's heart the composition of claim 20 in an amount sufficient to increase pacemaker current expression at the site, thereby treating the rhythm disorder in the mammal.

52-55. (Canceled)

56. (Currently Amended) The method of claim 51, wherein the composition is introduced by topical application to the cells of the heart, injection, microinjection or catheterization.
57. (Currently Amended) A method of inducing a pacemaker current in a mammal's heart which comprises site-specifically introducing directly into the heart the composition of claim 20 in an amount sufficient to induce a pacemaker current in the heart, wherein the MSC forms a gap junction with a cell of the heart, thereby inducing a pacemaker current in the heart.
58. (Canceled)
59. (Currently Amended) A method of inducing a pacemaker current in a cell cardiomyocyte which comprises contacting the cell cardiomyocyte with the composition of claim 20 in an amount sufficient to induce a pacemaker current in the cell cardiomyocyte, wherein the cell cardiomyocyte forms a gap junction with the MSC, thereby inducing a pacemaker current in the cell cardiomyocyte.
- 60-64. (Canceled)
65. (Currently Amended) A composition for delivering a pacemaker current to a synestial structure mammalian heart comprising a mesenchymal stem cell (MSC) incorporated with a nucleic acid which encodes a hyperpolarization activated, cyclic nucleotide gated 2 (HCN2) ion channel in an amount sufficient to create an ion channel in the cell MSC and deliver a pacemaker current when site-specifically introduced directly into the synestial structure heart, wherein the MSC is capable of forming a gap junction with a cell of the heart.
66. (Currently Amended) A method of inducing a pacemaker current in a mammal's heart which comprises site-specifically introducing directly into the heart the composition of claim 20 in an amount sufficient to increase inducing a pacemaker current in the heart, wherein the MSC forms a gap junction with a cell of the heart, thereby inducing a pacemaker current in the heart.

67. (Currently Amended) A method of inducing a pacemaker current in a cell cardiomycyte which comprises contacting the cell cardiomycyte with the composition of claim 20 in an amount sufficient to increase induce a pacemaker current in the cell cardiomycyte, wherein the cardiomycyte forms a gap junction with the MSC, thereby increasing inducing a pacemaker current in the cell cardiomycyte.